Computerization of Head and Neck Injury Information

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A standard reporting procedure for recording head and neck injuries does not exist, and as a result records vary from one institution to another. Since different terminology may be used to describe the same injury, correlation of injury data is impossible. To correct this situation, a standard format for recording accident victim head and neck injuries is being developed, and a computer program for digitizing the recorded information is being coded.

Lists of injuries, disabilities, and other information to be recorded have been provided by the newly established Head and Neck Injury Committee, sponsored by the Department of Transportation. This committee is divided into three subcommittee treating forensic, clincial, and experimental test information, respectively. Records from each group will be programmed and processed as shown in Figure 1. Eventually a data bank of injury records will be established.

A large volume of injury data is needed because of the anatomical variation between individuals and the wide range of conditions producing head and neck injuries. Although the volume of data is easily processed on the digital computer it is important to keep the records simple. A cumbersome format will discourage potential record suppliers. Manual transcription and manipulation of data must be minimized. Consequently, the injury description selected is succinct and employees terminology commonly used by physicians.

General case information will be recorded along with the injury description, to help establish the cause of the injury and possibly estimate the mechanical input to the head and neck. The case information will include:

1. Victim description (age, sex, weight, etc.).
2. Injury event description (type of accident, direction if impact, vehicle involved, estimate of closing velocity, etc.).
3. Protective devises worn (helmet, lap/shoulder belt).
4. Outcome or degree of disability.

The injury record will have the following general form:

injury name/anatomical locators/injury extent descriptors

Common injury names like, hemmorage, hematoma, contusion, and fracture are used. Secondary lesions due to complications following the accident will also be recorded and noted as such. Anatomical structure names are used as locators. The code will recognize these names and associate them with specific locations. In those regions where any injury is critical,

smaller anatomical structures are defined. Scaler measures are not used to locate injuries because of the variability between head sizes and the difficulty involved in making such measurements. Extent of the injury will be defined by either quantitative measures, such as lesion length, or by terms which imply a grade of severity such as mild or severe. An example record might read:

> Fracture/Cervical vertrabra no. 1, posterior arch/length (1cm) or word (separation)

It is important to record information from all three sources using the same format as shown in Figure 1. The records can be compared when the terminology is the same. One important objective is to identify those lesions which are seriously disabling or fatal. This will be accomplished by comparing the clinical and autopsy records as shown in Figure 2. Each source of data has inherent weaknesses, refer to Figure 3. However, through injury correlation it may be possible to extrapolate using the information from one of the other sources. For example, if a brain contusion observed at autopsy is comparable to that produced experimentally in cadavers, then the mechanical inputs may be comparable. The input is difficult to determine in autopsy cases, but is known in experiments.

This study of accident victims should benefit all levels of head injury research. Injury records are important in evaluating and designing head injury protection devices. They are also needed in the development of analytic head injury models. The traumatic event and injury produced can be correlated to reveal possible injury mechanisms using statistical or structural analysis models. With a large injury data base, it may be possible to anticipate the type of injury sustained in a specific type of accident. Such information would help in selecting the early course of treatment.

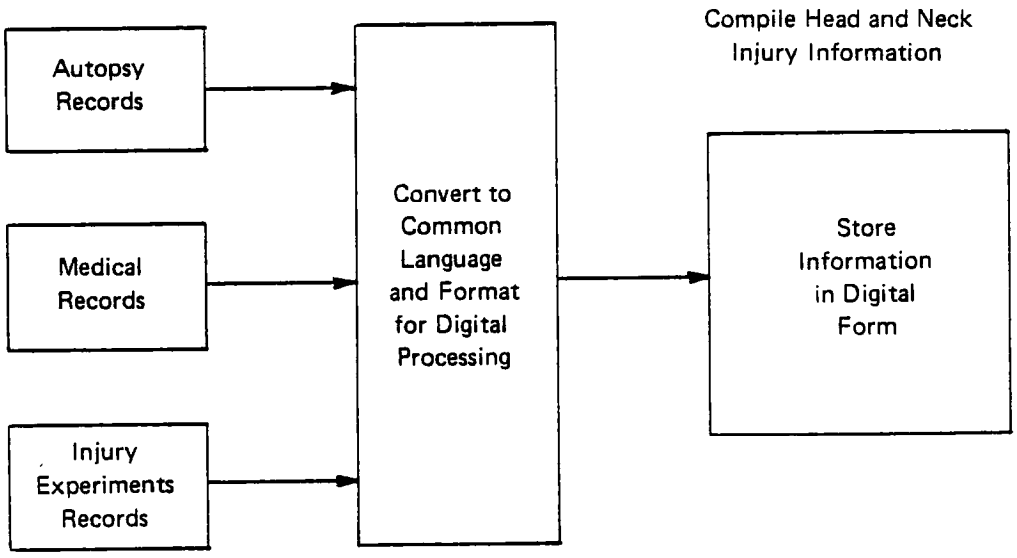

Figure 1. General Procedure.

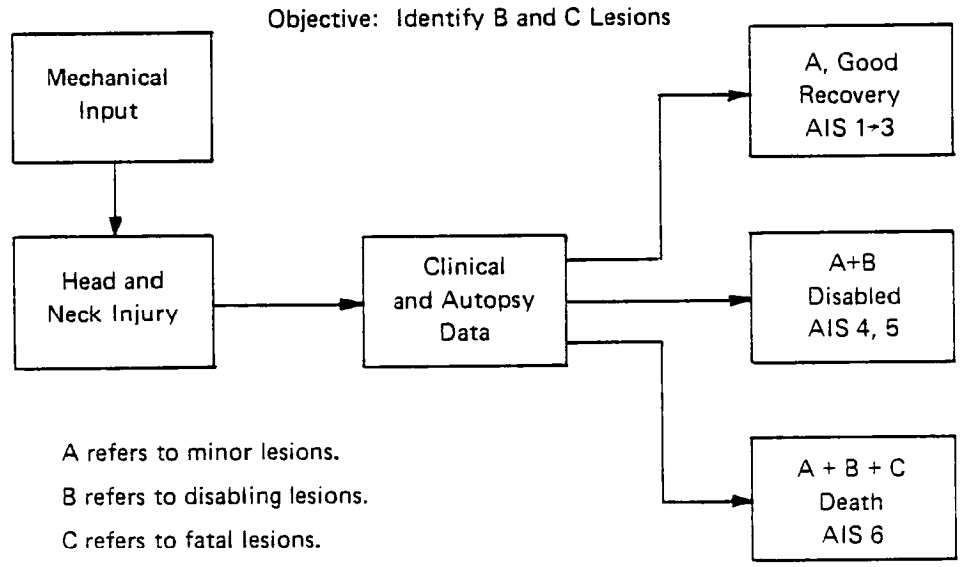

Figure 2. Lesion Identification.

Information Quality

Information Source	Accident Description	Relationship to Live Human	Injury Observation
Clinical	fair (relies on accident reconstruction)	good	fair CT scan is improving observability
Autopsy	poor (reports usually incomplete)	good	good
Animal Test	good (known impact force)	very poor (difficulty in extrapolating to the human)	good
Cadaver Test	good (known impact force)	fair (ability to simulate live human is limited)*	fair (limited injuries)*

*The only lesions which can be produced in the cadaver are contusions, lascerations, hemorrage, vessel rupture, and fracture.

Figure 3. General Evaluation of Information.